

New NMFS Scientific Reports Published

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NOAA Technical Report NMFS 42. Appolonio, Spencer, David K. Stevenson, and Earl E. Dunton, Jr. "Effects of temperature on the biology of the northern shrimp, *Pandalus borealis*, in the Gulf of Maine." September 1986, iii + 22 p., 25 figs., 7 tables.

ABSTRACT

Length-frequency data collected from inshore and offshore locations in the Gulf of Maine in 1966-1968 indicated that ovigerous female northern shrimp (*Pandalus borealis*) first appeared offshore in August and September and migrated inshore in the fall and winter. Once eggs hatched, surviving females returned offshore. Juveniles and males migrated offshore during their first two years of life. Sex transition occurred in both inshore and offshore waters, but most males changed sex offshore during their third and fourth years. Most shrimp changed sex and matured as females for the first time in their fourth year. Smaller females and females exposed to colder bottom temperatures spawned first. The incidence of egg parasitism peaked in January and was higher for shrimp exposed to warmer bottom temperatures. Accelerated growth at higher temperatures appeared to result in earlier or more rapid sex transition. Males and non-ovigerous females were observed to make diurnal vertical migrations, but were not found in near-surface waters where the temperature exceeded 6°C. Ovigerous females fed more heavily on benthic molluscs in inshore waters in the winter, presumably because the egg masses they were carrying prevented them from migrating vertically at night.

Northern shrimp were more abundant in the southwestern region of the Gulf of Maine where bottom temperatures remain

low throughout the year. Bottom trawl catch rates were highest in Jeffreys Basin where bottom temperatures were lower than at any other sampling location. Catch rates throughout the study area were inversely related to bottom temperature and reached a maximum at 3°C.

An increase of 40% in fecundity between 1973 and 1979 was associated with a decline of 2-3°C in April-July offshore bottom temperatures. Furthermore, a decrease in mean fecundity per 25 mm female between 1965 and 1970 was linearly related to reduced landings between 1969 and 1974. It is hypothesized that temperature-induced changes in fecundity and, possibly, in the extent of egg mortality due to parasitism, may provide a mechanism which could partially account for changes in the size of the Gulf of Maine northern shrimp population during the last thirty years.

NOAA Technical Report NMFS 43. Uchida, Richard N., Sigeiti Hayasi, and George W. Boehlert (editors). "Environment and resources of seamounts in the North Pacific." September 1986, v + 105 p.

SUMMARY

Presented are 20 papers and session summaries that constitute the proceedings of a workshop held 21-23 March, 1984 in Shimizu, Japan, and cosponsored by the Far Seas Fisheries Research Laboratory, Shimizu; the Honolulu Laboratory, NMFS Southwest Fisheries Center, Honolulu, Hawaii; and the Japanese Society of Fisheries Oceanography, Tokyo. Reviewed are seamount area oceanography and fisheries, population characteristics and biology of pertinent species, stock assessment of pelagic armorhead and alfonson, and gaps in knowledge about seamounts and future research directions.

NOAA Technical Report NMFS 44. Darcy, George H. "Synopsis of biological data on the porgies, *Calamus arctifrons* and *C. proridens* (Pisces: Sparidae)." September 1986, iii + 19 p., 26 figs., 8 tables.

ABSTRACT

Information on the biology and fishery resources of two common species of western Atlantic porgies, *Calamus arctifrons* and *C. proridens*, is compiled, reviewed,

and analyzed in the FAO species synopsis style.

NOAA Technical Report NMFS 45. Chen, Lo-chai. "Meristic variation in *Sebastes* (Scorpaenidae), with an analysis of character association and bilateral pattern and their significance in species separation." September 1986, ii + 17 p., 16 tables.

ABSTRACT

This report presents meristic data for nearly all of the known species of *Sebastes*. Rudimentary caudal ray counts tend to be higher in more active species. The number of caudal rays supported by the hypurals is consistently 14, whereas the number of branched caudal rays varies between 11 and 13. Vertebral counts and most fin-ray counts tend to be lower in species or populations in warmer latitudes, except for pectoral ray counts which tend to have an opposite geographic pattern. On the basis of the small magnitude of meristic and morphometric differences and the lack of other differences between northern and southern samples of "*Sebastes caurinus*," *Sebastes vexillaris* Jordan and Gilbert is regarded as a junior synonym of *Sebastes caurinus* Richardson. The patterns of bilateral variation in paired meristics are analyzed and their mechanism discussed. The frequency distribution of pectoral ray counts in their right-left combination is shown to be useful in species separation. No association was found between any combination of two meristic features in any species. The author proposes that intrasample associations between meristic features are evidence of sampling heterogeneity.

NOAA Technical Report NMFS 46. Brodeur, Richard D., and William G. Pearcy. "Distribution and relative abundance of pelagic nonsalmonid nekton off Oregon and Washington, 1979-84." December 1986, iii + 85 p., 60 figs., 6 tables, 7 app. tables.

ABSTRACT

Fifteen fine-mesh (32-mm mesh) pelagic purse seine surveys were conducted between 1979 and 1984 off the Oregon and Washington coasts. Environmental conditions varied greatly among the years sampled, and even within years, due to variability in upwelling conditions and productivity and the effects of a strong El Niño from late 1982 to the middle of 1984. In the 843 sets made, a total of 115,891 specimens from 69 taxa was collected. Most individuals collected belonged to nine dominant taxa. Seasonal and interannual variations in the abundance and distribution patterns of these dominant taxa are pre-

sented in detail. A recurrent group analysis delineated four major groupings of nekton.

Genetics and Fishery Management

“Population, Genetics, and Fishery Management, edited by Nils Ryman and Fred Utter, has been published by the Washington Sea Grant Program and is distributed by the University of Washington Press, P.O. Box 50096, Seattle, WA 98195-5096. Ryman is with Stockholm University Genetics Department and Utter is with the NMFS Northwest and Alaska Fisheries Center, Seattle, Wash.

There has not been substantial interaction between the fields of population genetics and fisheries management, the editors lament, and this book is aimed at addressing that void. And, they point out in the Preface, “it has become apparent that fisheries may diminish if the tools and theory of population genetics are not properly applied to the management of these resources.” That is one reason that the volume is an important contribution. It began as a series of lectures specifically on population genetics in relation to fisheries management. Those lectures, then, have been augmented with additional contributions from other experts in the field.

In this book, the editors and authors have applied the principles of population genetics to fishery management, excluding only the culture of fishes under controlled conditions throughout their entire life cycle—i.e., cage, pen, or pond-type culture. Few fisheries texts make much more than passing reference to the science of genetics, making this volume is even more useful.

In chapter 1, Fred Allendorf, Ryman, and Utter provide an overview of genetics and fishery management, calling attention to the need for applying the principles of population genetics to the management of natural fish populations and stocks, and providing a look at future directions for genetics in fishery management. In chapter 2, “Interpreting genetic variation detected by electro-phoresis,” Utter, Paul Aebersold, and Gary Winans review the collection and interpretation of genotypic data using electrophoretic procedures.

In chapter 3, G. A. E. Gall introduces

the basic theory of “Inbreeding” and the closely related concept of random genetic drift (though it is not a review of the consequences of inbreeding). Ranajit Chakraborty and Olof Leimar, in chapter 4, present some of the basic elements of population genetics as applied to subdivided populations, emphasizing methods and results important for the analysis and interpretation of allele frequency data. Then, in chapter 5, Gunnar Stahl provides an overview of the genetic population structure of the Atlantic salmon, *Salmo salar*, over the species’ entire range by examining genetic differences among natural populations and hatchery stocks from the various geographic regions.

Allendorf and Ryman then discuss genetic management of hatchery stocks in chapter 6 while in chapter 7 Donald E. Campton reviews pertinent literature on the application of population genetics to investigations of hybridization problems in fisheries management, and discusses the use of morphological characters for detecting natural hybridization. Then, Masatoshi Nei examines in chapter 8, genetic distance and molecular phylogeny, while W. Steward Grant covers genetic divergence between congeneric Atlantic and Pacific Ocean fishes in chapter 9.

In chapter 10, Jerome J. Pella and George B. Milner relate the use of allelic variants as genetic marks, with particular emphasis on estimating the contribution of different stocks to mixed-stock fisheries, while in chapter 11, Stephen D. Ferris and William J. Berg address the utility of mitochondrial DNA in fish genetics and fishery management. That is followed by a presentation of inter- and intraspecific variability patterns observed in salmonids (chapter 12). Chapter 13 reviews methods for induction of polyploidy and gynogenesis, and describes the most likely management roles of chromosome markers and manipulations in fishes.

The book then ends with two chapters related to the understanding, use, and conservation of genetic resources. The unique local adaptation of natural populations is discussed in chapter 14 and is suggested as a basis for modifying current management activities. Chapter 15 considers the effects of fishing and hatchery practices on the gene pools of ex-

ploited species, pointing out problems inherent in current harvesting policies and suggesting corrective courses of action.

The 24 contributors are principally geneticists, and although some of the contributions are quite technical, especially to those not schooled in the rudiments of genetics, it should still be of considerable use, as both a text and a reference and perhaps will help encourage the application of the principles of population genetics to fisheries management. Paperbound, the 420-page volume is available from the UW Press for \$17.50 (paperbound) or \$35.00 clothbound.

Biology and Management of Snappers and Groupers

In May 1985 the Honolulu Laboratory of the NMFS Southwest Fisheries Center sponsored a workshop on the biology and management of regional snapper and grouper stocks. Now, the proceedings have been published as **“Tropical Snappers and Groupers: Biology and Fisheries Management,”** edited by Jeffrey J. Polovina and Stephen Ralston of that Laboratory, by the Westview Press, 5500 Central Avenue, Boulder, CO 80301.

In sum, the book presents an excellent international perspective on those fishes, with the first half devoted to their taxonomy, reproductive biology, early life history, growth, mortality, and community-trophic interactions. Additional chapters examine the assessment and management of fisheries for snappers and groupers in Australia, Hawaii, and the Marianas, the southeastern United States, and the Gulf of Mexico and the Caribbean. Discussed are historical trends within the fisheries, methods of harvest are described, and analytical methods to provide estimates of population and yield parameters are evaluated and applied. A final chapter by John L. Munro draws together and summarizes the workshop presentations and suggests future research needs.

More specifically, in the first part, “Biological Reviews,” William Anderson outlines the systematics of the Lutjanidae while Gerald Allen presents a synopsis of the circumtropical genus *Lutjanus*. John Randall gives a preliminary synopsis of the groupers of the Indo-Pacific region. Then, Jeffrey Leis re-

views the early life history of tropical groupers and snappers, Churchill Grimes reviews the reproductive biology of the Lutjanidae, and Douglas Shapiro discusses grouper reproduction. Charles Manooch III reviews age and growth of snappers and groupers, Stephen Ralston examines mortality rates of both groups, and James Parrish details their trophic biology.

Snappers and groupers are large apex predators which are important fishery resources in many tropical and subtropical waters. This collection of reviews and data on these fishes, which are important commercially and recreationally, should be a reference of wide interest and use to many fisheries biologists and managers. The 659-page paperbound volume, part of Westview Press' Ocean Resources and Marine Policy Series, is available from the publisher for \$43.50.

The Aging and Growth of Fish

"Age and Growth of Fish," has been published by the Iowa State University Press, Ames, IA 50011. Managing editor for the volume was Robert C. Summerfelt and technical editor was Gordon E. Hall. Presented are 37 of 73 oral and poster papers from the International Symposium on Age and Growth of Fish held in Des Moines, Iowa, 9-12 June 1985. The symposium served a dual purpose—as a forum for those studying the age and growth of fish and to honor the professional life of Kenneth D. Carlander upon his retirement from the faculty of Iowa State University. Also included are three additional papers to add depth to the coverage. "Techniques for the estimation of RNA, DNA, and protein in fish" by Lawrence J. Buckley and Frank J. Bulow, and "Uptake of ^{14}C -glycine by fish scales (in vitro) as an index of current growth rate" by Greg P. Busacker and Ira R. Adelman were added to provide basic biochemical methodology for the study of current growth rate; "Methodological approaches to the examination of otoliths in aging studies" by E. B. Brothers was included to provide insight for the study of otoliths from the author's experience. A glossary, developed by a "Glossary Committee" chaired by C. A. Wilson,

will allow a better understanding of basic terminology and help to standardize them.

Research on the aging of fish has made great strides in the last couple of decades, as evidenced by this symposium and volume. The book's subject matter is taxonomically diverse, including clams and lobsters, sharks, and bony fishes in freshwater and marine habitats ranging from tropical and temperate areas, to mountain streams and man-made lakes. The topics ranged from study of length-frequency distributions, enumeration of marks on hard parts—including scales, otoliths, bones, and spines—validation methods, biochemical procedures for study of short-term growth, and mathematical-statistical considerations for back-calculating and describing fish growth.

The contributions are arranged in seven parts: Part I, History, problems, and current status; Part II, Characterization of growth; Part III, Variability, error, and bias; Part IV, Validation; Part V, Methods; Part VI, Larval and juvenile fish aging and studies; Part VII, Applied studies.

Some topics of interest include Carlander's history of scale age and growth studies of North American freshwater fish, and "Current trends in age determination methodology" by Richard J. Beamish and Gordon A. McFarlane. Frank Bulow presents a review of RNA-DNA ratios as indicators of growth in fish while Ira R. Adelman reviews "Uptake of radioactive amino acids as indices of current growth rate of fish." Other articles address linear models for the growth of fish, estimating and interpreting annual growth rates, reliability of age and growth-rate estimates derived from otolith analysis, lack of first-year annuli in scales of western trout validating daily increment deposition in otoliths of larval fish, use of tagging programs to validate scale readings, validation of dorsal spine method of aging spiny dogfish, use of microcomputers in age and growth studies, age determination of ocean bivalves, and much more. This is a large and impressive volume which presents much important and recent research on the topic, as well as several substantive reviews, and it is an excellent representation of contemporary research. It also includes an extensive and useful bibliogra-

phy and subject and taxonomic indexes. The 544-page hardbound volume is available from the publisher for \$34.95.

Studies on Fish Behavior and Fisheries Management

The *Journal of Fish Biology* has published for the Fisheries Society of the British Isles the FSBI Symposium entitled "The Behaviour of Fishes," edited by T. J. Pitcher, A. E. Magurran, and A. R. Margetts. Pitcher and Magurran are with the School of Animal Biology, University of Wales, and Margetts, *JFB* editor, is with the Fisheries Laboratory, Lowestoft, Suffolk, England.

Papers accepted for this issue of the *Journal* center on themes of reproductive behavior (i.e., mate selection), schooling behavior and fish movement, foraging behavior (i.e., constraints on optimality), aggression, development, and behavioral physiology. Keynote papers published here include G. P. Baerends on causation and function of the prespawning behavior of cichlids; G. W. Barlow on mate choice in the monogamous and polychromatic Midas cichlid, *Cichlasoma citrinellum*; and M. Milinski's review of competitive resource sharing under constraints in sticklebacks.

Additional papers of interest include those on tilting behavior of the Atlantic mackerel, *Scomber scombrus*, at low swimming speeds by P. He and C. S. Wardle; heart rate as an indicator of activity, metabolic rate, food intake, and digestion in pike, *Esox lucius*, by J. D. Armstrong; behavior of the abyssal grenadier, *Coryphaenoides yaquinae*, monitored using ingestible acoustic transmitters in the Pacific Ocean by I. G. Priede and K. L. Smith, Jr.; migrational swimming speeds of the American shad, *Alosa sapidissima*, in the Connecticut River by H. M. Katz; development of feeding behavior in larval lumpfish, *Cyclopterus lumpus*, by J. A. Brown; development of schooling behavior in the European minnow, *Phoxinus phoxinus*, by A. E. Magurran; a light intensity threshold for schooling in the Atlantic mackerel, *S. scombrus*, by C. W. Glass et al.; predation and minnow schooling at twilight by T. J. Pitcher and J. R. Turner; visual cues determining prey selection by the turbot, *Scophthalmus maximus*, by

R. A. Holmes and R. N. Gibson; optimal foraging behavior in the rainbow trout, *Salmo gairdneri*, by M. Bres; and a test of a size-selective predation model with juvenile brook charr, *Salvelinus fontinalis*, by J. W. A. Grant and D. L. G. Noakes. Other papers discuss mate choice in various cichlids, causes and function of prespawning cichlid behavior, influence of species composition on behavior in mixed-species cyprinid schools, and size sorting in minnow schools.

The 232-page paperbound symposium was published as Supplement A to Volume 29 of the *JFB*; a separate index to the issue is provided and it is sold by Academic Press Inc. (London) Limited, High Street, Fooks Cray, Sidcup, Kent DA14 5HP England (individual copy price not listed), and should be of interest to those studying or researching aspects of the behavior of fishes.

Another FSBI symposium also published by the *Journal of Fish Biology* is "The Scientific Basis of Inland Fisheries Management," convened by R. Williams and edited by Williams, A. R. Margetts, and J. M. Elliott. Williams is with the Department of Applied Biology, University of Wales Institute of Science and Technology, Cardiff; Margetts is *JFB* editor; and Elliott is with the Freshwater Biological Association, Windermere Laboratory, Ambleside, England. Symposium topics included salmonids and the factors influencing their management; environmental impacts of fish farming and of pesticide discharges; sampling methods and water quality standards for nonsalmonids; fluctuations in year-class strength and management strategies for selected fisheries; and the use of models and environmental indices in fisheries management. The papers concern both fisheries for gamefish alone and for species sought by both commercial and sport fishermen.

Topics of interest include some fundamental research problems in the management of Atlantic salmon, *Salmo salar*, in Canada by E. M. P. Chadwick; factors governing the production of juvenile Atlantic salmon in Scottish streams by H. J. Egglishaw and P. E. Shackley; population dynamics of the migratory brown trout, *Salmo trutta*, in an English stream

and their implications for fisheries management by J. M. Elliott; salmon stock and recruitment, and stock enhancement by D. J. Solomon; brown trout growth and survival factors in different types of streams by M. Zalewski et al.; habitat evaluation as a fisheries management tool by N. J. Milner et al.; and the environmental impact of salmonid cage culture on inland fisheries by M. J. Phillips et al.

Other papers discussed possibilities of improving catchable fish stocks in lakes undergoing eutrophication, an evaluation of pulse fishing for the walleye, *Stizostedion vitreum vitreum*, in Henderson Lake, Ontario, a pike culling strategy for trout management in the River Avon, environmentally induced fluctuations in year-class strength and their implications for fishery management, survey methods and various sampling strategies for fish population assessment; cost effective sampling of fish populations in large water bodies; and the assessment of flow characteristics at certain weirs in relation to the upstream movement of migratory salmonids.

The volume provides an interesting and useful variety of papers on some of the biotic, chemical, and physical factors that impinge on the management of inland fisheries and anadromous fishes. The 300-page paperbound issue—Supplement A to Volume 27 of the *JFB*—is available from the publisher (single copy price not given).

Marine Photochemistry, Pollution Study Progress

"Sources and Fates of Aquatic Pollutants," edited by Ronald A. Hites and S. J. Eisenreich, has been published by the American Chemical Society, 1155 Sixteenth Street, N.W., Washington, DC 20036 as No. 216 in its *Advances in Chemistry Series*. The volume was developed from a symposium sponsored by the ACS Division of Environmental Chemistry.

Only in the past decade, the editors point out, have the processes controlling the transport and fate of inorganic and organic species in limnic and marine environments been delineated, and the processes are studied with a holistic ap-

proach to aquatic pollutant chemistry, in which the atmosphere, water, and sediment are considered interdependent compartments of an ecosystem. This volume, in 16 chapters, presents this holistic approach and describes the relationship between physical mixing rates and chemical reaction rates in four sections: Air-water processes, water column processes, water-sediment processes, and case studies. The first three sections emphasize the chemical and physical processes controlling solute behavior and fate in air and water, while the case studies integrate information on those processes into a systemwide picture of the cycling of inorganic and organic chemicals. Specific topics include environmental modeling of hydrophobic organic compounds, air-sea transfer of trace elements, vapor-particle partitioning of semi-volatile organic compounds, and metal speciation in natural waters. Other topics include mechanisms controlling the distribution of trace elements in oceans and lakes, the role of particulate matter in the movement of contaminants, PCB's in Lake Superior, element cycling in wetlands, and much more. The volume will be a very useful reference for advanced students and marine and atmospheric scientists who deal with these problems. Hardbound, the 558-page volume is available from the ACS Distribution Office at \$99.95 (U.S. and Canada) and \$119.95 elsewhere.

Also published by the ACS as ACS Symposium Series 327 is "Photochemistry of Environmental Aquatic Systems," edited by Rod G. Zika and William J. Cooper. The book was developed from a symposium sponsored by the ACS Divisions of Geochemistry and Environmental Chemistry. The field of aquatic photochemistry encompasses a wide diversity of areas with environmental science. However, the study of photochemistry in aqueous solution, and in particular its application to environmental processes, is relatively new. Natural waters receiving solar radiation are active photochemical reactors, while naturally occurring humic substances are relatively efficient initiators of photochemical reactions. This 20-chapter volume, the first to deal specifically with marine and freshwater photochemistry, is therefore a

valuable source of information for scientists and students in the field.

Following an introductory overview, the remaining chapters are presented in five sections: Transformation of xenobiotic compounds, inorganic photooxidants, photosensitization in natural waters, heterogeneous reactions, and modeling and actinometry. Some of the topics covered in individual chapters include photolysis of phenol and chlorophenols in estuarine waters, the mechanism of photolytic ozonation, time-resolved fluorescence measurements on dissolved marine organic matter, catalyzed photodegradation of two herbicides, and photochemical modeling as applied to natural waters. Others include photochemistry of copper complexes in sea water, consequences of OH radical reaction in sea water, natural photosensitizers in sea water (riboflavin and its breakdown products), and more. The 288-page hardbound volume is available from the ACS for \$54.95 (U.S. and Canada) and \$65.95 elsewhere, and the volume should be of interest to environmental and marine chemists and biologists.

A GUIDE TO THE PERCHES

Publication of "**The Biology of Perch and Related Fish**" by J. F. Craig has been announced by Timber Press, 9999 S.W. Wilshire, Portland, OR 97225. The author is a research scientist with the Freshwater Institute, Department of Fisheries and Oceans, Winnipeg, Canada.

Certain members of the perch family are economically important, both as food and sport fishes, and have been extensively studied. These include the perch and zander of Eurasia and the yellow perch and walleye of North America. Other common members of the family include the ruffe, sauger, and several species of the three genera of darters. In this book, the author reviews and summarizes important aspects of the biology of the perches and highlights areas needing future research. Following an introductory chapter on percid taxonomy, the bulk of the book is then devoted to the biology of the species *Perca* and *Stizoste-*

dion.

Obviously an immense volume could be devoted to such a topic; however, this smaller volume presents a well-rounded introduction to and reference on the perches and their biology. The author covers in some detail perch anatomy and morphology, growth, mortality and longevity, and reproduction and development. Other topics covered include food, feeding, and energetics; physiological processes and movements; parasites and diseases; adaptation, evolution, and genetics; population dynamics and community structure; and the fisheries and economic importance of various species along with their exploitation, culture, and vulnerability to pollution and other environmental perturbations. The final part of the book is devoted to very brief synopses of the biology of other percids (*Gymnocephalus* and *Percarina*) and the Etheostomatini and the Romanichthyini. Well illustrated, the book also includes a bibliography and author index as well as a subject index, and is a fine, succinct reference to an important family of fishes. The small format 333-page hardbound volume is available from the publisher for \$42.50 plus \$3.00 shipping and handling.

The New England Fishing Industry and How It Works

"**The New England Fishing Economy**" by Peter B. Doeringer, Philip I. Moss, and David G. Terkla, has been published by the University of Massachusetts Press, P.O. Box 429, Amherst, MA 01004. It is subtitled "Jobs, Income, and Kinship" and is a thorough look at the structure and workforce of that region's fishing industry and how it has adapted to various changes. Of interest to many readers will be the contrast revealed between capitalist, collective bargaining, and kinship practices governing jobs and income in the industry, which is then related to fisheries regulation. The authors are members of the Department of Economics and are associated with the Institute for Employment Policy at Boston University.

The volume is the result of team research begun in late spring 1982 to deter-

mine how a shift in the U.S.-Canadian fishing boundary would affect socioeconomic conditions in New England. Much of the literature on fisheries policy and regulation, say the authors, assumes that the movement of resources in and out of the fishing industry is relatively easy; however, they believe that their book shows that the assumption of such flexibility is incorrect. Downward adjustment in the work force is difficult, they report, at least for the core of the New England fishing industry, due in part to labor market conditions in fishing ports, but mainly to social and institutional mechanisms that tie resources to the industry. The result, they say, is that resources often remain idle during bad times rather than being reemployed outside the industry.

Case study analysis concentrated on the ports of Gloucester and New Bedford, Mass. The book is presented in two parts, and Part I develops background materials on the New England fishing industry, its work force, and the local port economies, including an overview of the changes in the fishing industry in New England since 1960, the economic trends and economic and institutional setting of fishing and fish processing in Gloucester and New Bedford, and an examination of the social and cultural dimensions of the labor force in fishing and processing in the two ports.

Part 2 addresses the dynamics of adjustment to economic change—examining adjustments in employment and income within the fishing industry in response to economic change, describing institutional rules governing employment and pay in different parts of the fishing industry, and demonstrating how these rules operate to determine the incidence of change within the industry. Explored is the question of employment flows between fishing and the rest of the economy, the extent of skill transferability, the comparability of earnings, and the income and employment alternatives for displaced fishermen and processing workers. A final chapter presents the conclusions and develops a series of recommendations for fisheries management policies. The 147-page hardbound volume is available from the publisher for \$22.50.

The Ecology of Tropical Fishes

"Ecological Studies in Tropical Fish Communities," by R. H. Lowe-McConnell, has been published in the Cambridge Tropical Biology Series by the Cambridge University Press, 32 East 57th Street, New York, NY 10022 in both paper and hardbound editions. Many tropical fish communities are of considerable scientific interest as they provide an excellent outdoor laboratory for studying evolutionary processes, as well as providing a wealth of information for those studying theoretical aspects of community ecology. Likewise, reef fishes also provide excellent data for assessing the costs and benefits of different types of social and reproductive behavior. In this new volume, the author compares information on the ecology of fishes from tropical fresh waters and seas to examine general principles and to identify gaps in knowledge. Some of the material has been treated in the author's two earlier books ("Fish Communities in Tropical Freshwater" and "Ecology of Fishes in Tropical Waters"). This new volume, though, is an updating of his earlier ones, and a reinterpretation of portions of it in light of more recent studies.

The book has 14 chapters arranged into four parts—an introductory section, freshwater studies, marine studies, and four syntheses: Responses of fishes to conditions in tropical waters, trophic interrelationships, the maintenance and evolution of diversity, and, finally, a look at the exploitation and conservation of tropical fish stocks.

Following an overview of the ecology of tropical freshwater and marine environments and their associated fish faunas, the author relates a number of freshwater studies drawn from the African, South American, Asian, and New Guinean tropics. Special consideration is given to the new man-made lakes which have provided large-scale experiments on the change of riverine fish communities to lacustrine ones, and to the great lakes of East Africa for examples of recent species evolution.

The marine section describes direct observations of coral reef fishes and discusses how the great diversity of reef communities is maintained. It also exam-

ines data from trawl surveys and from pelagic fisheries, especially for sardines in coastal upwellings and tuna from open seas.

In the synthesis section, the responses of fish to the varied conditions in tropical waters are discussed, including the effect of seasonality upon life history strategies, and how these enable so many species of fish to coexist. The final chapter deals with man's utilization of tropical fish, and their production and conservation.

The volume concludes with an appendix of fish families in tropical waters, and an extensive list of references. With its broad and comprehensive coverage, the volume should become a well-used reference on the ecology of tropical fish communities and be a good source of material on tropical fisheries biology, ecology, and behavior. Indexed, the 382-page volume is available from the publisher for \$64.50 (cloth) and \$22.50 (paper).

Seal Controversies in Atlantic Canada

Such marine mammals as seals are seen by some as a harvestable food or fur resource, a competitor for fish, and by others as creatures needing love and full protection for various ethical or moral reasons. Many of those views, and the holders of them, are discussed in the book **"Seal Wars! An American Viewpoint,"** by Janice Scott Henke, published by Breakwater Books, Ltd., 277 Duckworth Street, P.O. Box 2188, St. John's, Newfoundland, Can., A1C 6E6. The New York author is a cultural anthropologist and cultural resources consultant who also is a licensed New York State wildlife rehabilitator.

In one sense, the book is a fundamental look at the Canadian sealing industry from the days when east coast sealing was considered "the greatest hunt in the world" to the present when it has been virtually halted by animal-rights groups. It is the culmination of 4 years of research by the author on seal ecology, seal harvests, the sealers, and the anti-seal-hunt protection groups. The subject, she candidly admits, is one "on which no feel-

ing, compassionate human can remain entirely neutral."

The book is sympathetic toward those people who have been most affected by the seal-hunt protests—the Inuit of Greenland and Canada and the Newfoundlanders and other Maritimers who have hunted seals on a subsistence basis for hundreds of years. And in reviewing the rise of the various anti-seal-hunt groups, it is critical of the emotionalism and, especially, of the effect of the hunting protests have had on the Native cultures. Thus, the book casts unique light on a highly controversial issue. In a postscript to the book, the author states her belief that there was no justification for abolition of Canada's harp seal hunts, and that descriptions of the seal hunts on seal herds were incorrect, as were claims of cruelty to the seals. At any rate, she has provided another look at the problems involved in trying to manage a natural resource on the basis of differing views of "morality," and for that reason it makes for some interesting and instructive reading. The 215-page paperbound volume is available from the publisher and costs \$9.95.

Another Look at the LOS Treaty

"The 1982 Law of the Sea Treaty," published by Washington Sea Grant Communications, University of Washington, HG-30, 3716 Brooklyn Avenue, N.E., Seattle, WA 98105, is subtitled "One observer's assessment of the conference, the treaty and beyond." Presented by law professor Thomas A. Clingan, Jr., it is the 12th in the series of McKernan Lectures established by the UW. Here, the author provides a rather personal account and interpretation of the conduct and outcome of the LOS treaty and its effectiveness, and he attempts to answer the question: "Is the LOS Treaty a success or a failure?" He also speculates on the future of the LOS Treaty in the context of several possible scenarios and cautions against nations adopting short-term, bilateral solutions to problems that might "undermine the international public order." The paperbound 19-page treatise, WSG 86-1, is sold by the publisher for \$3.00.